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bacterial pollution of bathing beaches in the regional municipality of Ottawa-Carleton

BACTERIAL POLLUTION OF BATHING BEACHES IN THE

REGIONAL MUNICIPALITY OF OTTAWA-CARLETON

MOONEY'S BAY, BRIGHTON, BRANTWOOD AND STRATHCONA
ON THE RIDEAU RIVER

BRITANNIA AND WESTBORO ON THE OTTAWA RIVER

PREPARED BY

ONTARIO WATER RESOURCES COMMISSION
DIVISION OF SANITARY ENGINEERING
DISTRICT ENGINEERS BRANCH

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ABSTRACT:

This report reviews the situation existing at the six main bathing beaches within the Regional Municipality of Ottawa-Carleton.

Bacteriological data available at the beaches and for the Ottawa and Rideau Rivers are summarized and reviewed. Results from two OWRC sampling programs are presented and discussed.

Several recommendations are made to the Regional Municipality and to the Area Health Unit.

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INTRODUCTION

On September 23, 1970, Dr. L. H. Douglas, Director and Medical Officer of Health of the Ottawa-Carleton Area Health Unit declared the bathing beaches in the City of Ottawa unfit for swimming.

This report reviews the existing situation on the two waterways involved and presents recommendations aimed at improving that situation.

CONCLUSIONS OF THE REPORT

The data presented in this report lead to the following conclusions:

1) Based on samples obtained by the Regional Health Unit, four of the discussed six beaches satisfied the OWRC water criteria for bathing beaches in 1970, i.e. Mooney's Bay, Brantwood, Westboro and Britannia Beaches.
2) Efforts made to decrease bacterial levels at the bathing beaches have shown particular success since the years 1967 and 1968. There exists no reason for supposing that increased efforts will not be met with correspondingly successful results.
3) There is a correlation between high bacterial levels at the six beaches and the incidence of rainfall within the Regional Municipality. This correlation is highly indicative of bacterial entry through sewage overflow, storm sewer, and catchbasin outfalls, and seepage from private sewage disposal systems.
4) The water entering the Regional Municipality of Ottawa-Carleton through either the Rideau or the Ottawa Rivers is of good bacteriological quality. This conclusion is based on the results of sampling programs carried out during the year 1970

involving a total of 314 samples collected on the Rideau River and 88 samples from the Ottawa River.

5) Coliform and fecal coliform counts definitely increase within the heavily-populated areas of the Regional Municipality. Several sets of results, particularly those of the Pollution Control Division, support this conclusion. The most probable sources of bacterial entry within these areas are sewage overflow, storm sewer and catchbasin outfalls, and drainage from private sewage disposal systems.

6) Two detailed sampling programs carried out on the Rideau and Ottawa Rivers respectively have identified several major sources of bacterial entry into the waterways. The most serious sources have been found to be storm sewer outfalls and tributary streams. The specific locations are included in the report.

7) The degree of bacterial contamination introduced by various tributaries within the Regional Municipality is significant. Britannia and Mooney's Bay Beaches appear to be particularly subject to contamination from these sources. A method of identifying the more important polluting tributaries is proposed. The method has been applied to tributaries discharging into the Rideau River. The degree of control which can be exerted upon a polluting source has to be considered when applying the method.

8) Immediate and well-directed action by all agencies involved with maintaining the quality of water in the Rideau and Ottawa Rivers should certainly result in a substantial lowering of bacterial levels at all six area bathing beaches. Recommendations on this action are included in this report.

9) It should be recognized that a potential for bacteriological water quality impairment exists wherever bathing beaches are established in urban areas.

RECOMMENDATIONS

The recommendations are directed as follows:

It is recommended to the Regional Municipality of Ottawa-Carleton and the constituent municipalities that:

1) A specialized group be formed within the Region's Division of Pollution Control with the specific task of identifying and correcting pollution sources within the Regional Municipality. The formation of such a group would serve to co-ordinate and direct efforts towards meaningful goals.
2) No new construction be allowed without proper ensurance that no contaminating flows are allowed to enter storm sewers or watercourses by virtue of improper connection or inadequate construction methods.
3) Wherever contaminated storm sewers are identified, a program be prepared now for the proper disinfection of the contaminated lines before the start of the next recreational season. Disinfection of contaminated lines, through flushing and batch-chlorination, would be a temporary measure until the actual specific pollution source was identified and corrected.
4) Continuing efforts be directed at minimizing the amount and frequency of sewage overflow into the waterways. This recommendation is on a long term basis depending upon the expansion of existing sewage works.

5) Inadequate private sewage disposal systems be identified and corrected. This would be a joint venture of the health unit and the previously recommended special group within the Region's Division of Pollution Control.

6) A continuing program of detailed bacteriological sampling should be instituted for the recreation period. The program should be formulated in such a way that the identification of pollution sources be facilitated.

7) Chlorination be instituted throughout the recreational period at the following tributaries: Nepean Creek, Sawmill Creek and Uplands Creek discharging to the Rideau River; Watt's Creek and Graham Creek discharging into the Ottawa River. It is possible that Stillwater Creek should also be chlorinated. It is suggested that manual chlorination would not be adequate. The use of hypochlorinators should be considered, particularly at Nepean, Sawmill and Watt's Creeks. An extensive search for pollution sources discharging into these tributaries should be carried out. Chlorination of streams is a temporary measure to allow use of the area bathing beaches during the 1971 recreational period.

8) Frequent reports of progress in these programs be directed to both the OWRC and the Regional Municipality's Health Unit. This will allow these two regulatory groups to continuously reassess the situation at the bathing beaches.

It is recommended to the Health Unit of the Regional Municipality of Ottawa-Carleton that:

1) The OWRC water quality criteria for Total Body Contact Recreation as outlined in Chapter 1 of this report be adopted in evaluating the acceptability of area bathing beaches. (*)

2) Attempts be made to differentiate those beaches which carry considerable bacterial loads. The present report clearly shows that bacteriological quality of the six beaches is often quite different.

3) Note be taken of the considerable progress made by the Regional Municipality in combatting bacterial pollution over the previous three years. It is expected that further improvement will be realized if the recommendations made in this report are implemented before the 1971 recreational season.

* THE OWRC CRITERIA HAVE BEEN DEVELOPED FROM ONTARIO EXPERIENCE AND A REVIEW OF SCIENTIFIC WATER QUALITY CRITERIA EMPLOYED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY (FORMERLY FWQA, DEPARTMENT OF THE INTERIOR), THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES, THE MICHIGAN WATER RESOURCES COMMISSION, THE INDIANA WATER POLLUTION CONTROL BOARD, THE OHIO WATER POLLUTION CONTROL BOARD, THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, THE NEW ENGLAND INTER-STATE WATER POLLUTION CONTROL COMMISSION, THE OHIO RIVER VALLEY WATER SANITATION COMMISSION AND THE INTERNATIONAL JOINT COMMISSION. ALSO CONSIDERED WERE THE BATHING WATER STANDARDS OF THE ONTARIO DEPARTMENT OF HEALTH, RECOMMENDATIONS FROM THE CANADA DEPARTMENT OF NATIONAL HEALTH & WELFARE, THE INTERNATIONAL STANDARDS FOR DRINKING WATER OF THE WORLD HEALTH ORGANIZATION, STANDARD METHODS FOR THE EXAMINATION OF WATER & WASTEWATER, TWELFTH EDITION, 1965, APHA, AWWA, WPCF, AND THE RECENT WORK OF BROWN, J.R. (1), BACTERIOLOGICAL STANDARDS FOR BATHING WATER: MEDICAL SERVICES JOURNAL (CANADA) VOL.21, 778-786, 1965.

(1) - PROFESSOR AND HEAD, DEPARTMENT OF PHYSIOLOGICAL HYGIENE, SCHOOL OF HYGIENE, UNIVERSITY OF TORONTO.

CHAPTER 1 - REVIEW OF THE AREA HEALTH UNIT'S BACTERIOLOGICAL RESULTS FOR 1970.

The Regional Area Health Unit collects water samples for bacteriological analysis at all major bathing beaches within the Regional Municipality. The sampling program extends from May through August, the recreational season. The 1970 results constituted the basis for Dr.Douglas' decision to declare the bathing beaches unfit for swimming. The criteria which Dr.Douglas used in arriving at his decision reads as follows:

HEALTH UNIT RECOMMENDED LIMITS

Waters Designated for Primary Contact Recreation
Not more than 10% of samples in a selective sampling program to exceed 100 Fecal Coliforms per 100 ml. (*)

The OWRC sets forth a bacteriological criteria for Total Body Contact Recreation in the Commission publication "Guidelines and Criteria for Water Quality Management in Ontario".

OWRC MICROBIOLOGICAL CRITERIA

In part, the criteria reads as follows:
"Water used for body contact recreational activities should be free from pathogens including any bacteria, fungi or viruses that may produce enteric disorders or eye, ear, nose, throat and skin infections. Where ingestion is probable, recreational waters can be considered impaired when the coliform, fecal coliform, and/or enterococcus geometric mean density exceeds 1000, 100 and/or 20 per 100 ml respectively, in a series of at least ten samples per month, including samples collected during week-end periods".

* THESE LIMITS HAVE BEEN EXTRACTED FROM A STATISTICAL COMPARATIVE ANALYSIS SUMMARY FORWARDED TO THE KINGSTON REGIONAL OFFICE OF THE OWRC.

It is quite obvious that the criteria for bathing beach waters followed by the two agencies are quite different. Figures 1.1a through 1.1f graphically represent the discrepancy when bacteriological data gathered by the Regional Area Health Unit at the bathing beaches is subjected to comparative analysis. It can be noted that all the beaches failed to meet the Regional Health Unit criteria though four (4) of these same beaches yielded results within OWRC limits for fecal coliforms. The four beaches of acceptable bacteriological quality were Mooney's Bay and Brantwood Beaches on the Rideau River and both Britannia and Westboro Beaches on the Ottawa River. Brighton and Strathcona Beaches can both be considered bacteriologically impaired under either set of criteria. It should also be noted that none of the beaches yielded total coliform geometric mean densities greater than 1000/100 ml. The data for these graphs is included as Appendix A.

Figures 1.2a through 1.2f show how the geometric means of total and fecal coliform determinations varied over the past eight years. These graphs show that efforts made to curb bacteriological pollution in both waterways have met with success, particularly from the year 1968. The graphs also show that the situation is being improved yearly and that further efforts can be expected to have beneficial results. It should also be quite clear that an assessment of the beaches can only be valid on a yearly basis. The history of pollution at some of these beaches is inconsequential to the present assessment of the beaches.

For example, the 1970 bacterial levels at Mooney's Bay are acceptable whereas the 1967, 1968 and 1969 results are unfavourable. This beach should not be condemned on the basis of results collected over the past few years. It is our opinion that only current data should be used to estimate the water quality at the six beaches discussed. The efforts made by various pollution abatement agencies have resulted in beaches that are substantially improved over those of past years. The data for these graphs is included in Appendix B.

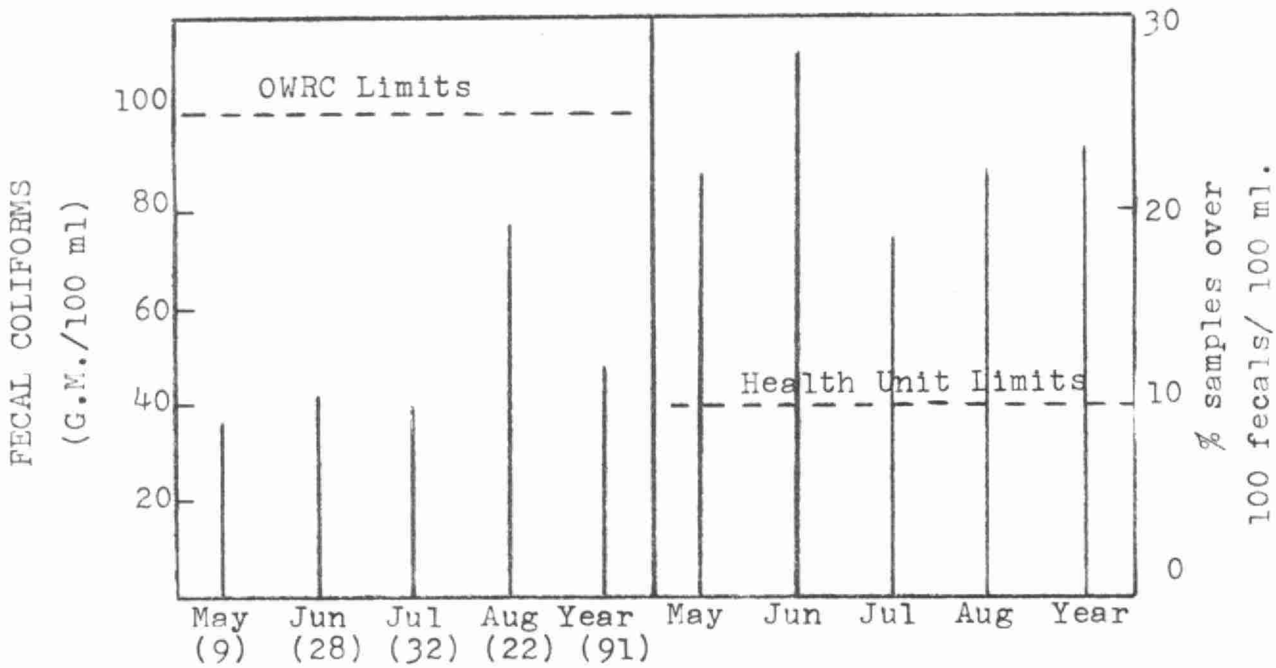
Further information can be extracted from the data when the incidence of high bacterial counts is compared to precipitation. The Regional Health Unit's bacteriological results for 1970 are included in Appendix C. The precipitation throughout the period of sampling has been included in Table 7. There is quite clearly a correlation between excessively high bacterial counts and the incidence of rainfall. In most instances, a time lag of 24 to 48 hours is required before the high count is exerted. There is also a detectable trend for bacterial counts to be particularly high after rainfall if the day during which precipitation occured was preceeded by a period of relatively dry weather. The data of August 17th at Brighton and Brantwood Beaches represent typical instances. The occurences of excessively high bacterial pollution, a condition arbitrarily set at total coliforms greater than 2000 and/or fecal coliforms greater than 300/100 ml. have been summarized in Tables 1 through 6. The occurences and amounts of precipitation are included in Table 7. A comparison of Tables 1 through 6 with Table 7 indicates that 85% of all instances of high bacterial contamination can be

associated with precipitation greater than 0.15 inches either on the day of sampling or within the previous 48 hours of the day of sampling. Only 43% of the total number of samples can be associated with the same set of conditions.

At all six beaches, for every instance in which a substantial amount of precipitation is followed by low bacterial contamination, that rainfall has been preceeded by a period of wet weather. Such an instance occurs at Mooney's Bay Beach on August 21st. The rainfall on the 20th has been preceeded by rain on the 19th, 16th, 15th and 14th.

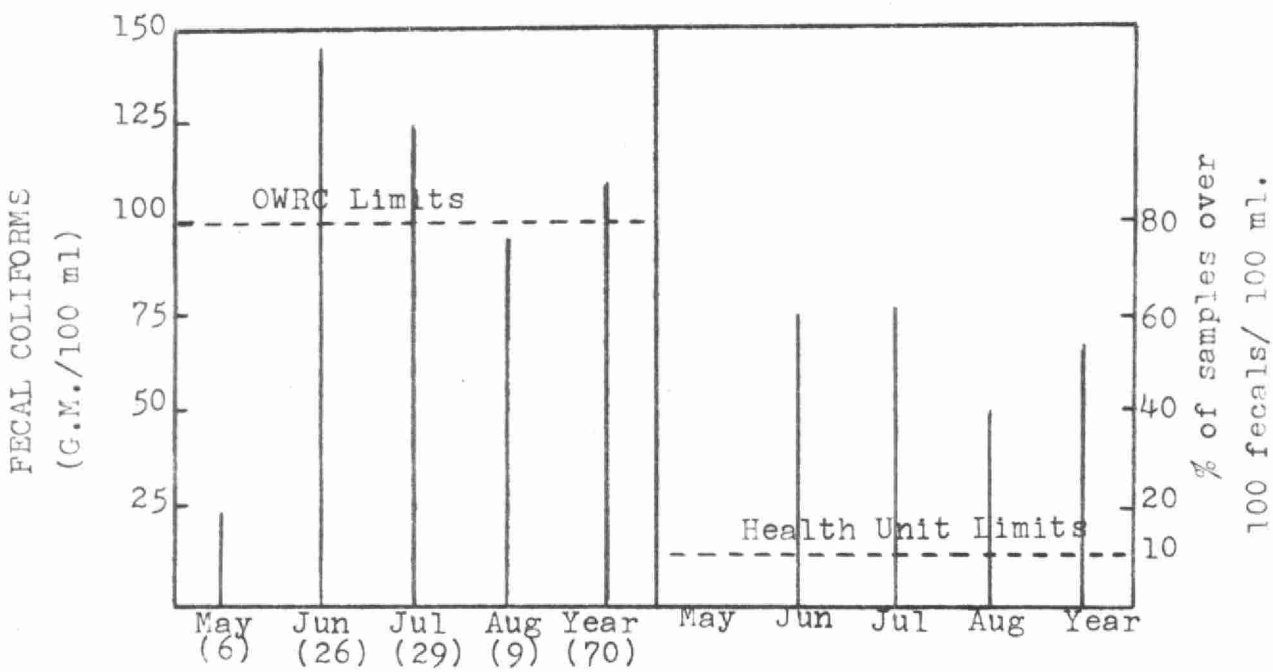
OWRC and HEALTH UNIT CRITERIA

- 1970 RESULTS -



MONTH (no of samples included)

FIGURE 1.1a - MOONEY'S BAY BEACH



MONTH

FIGURE 1.1b - BRIGHTON BEACH

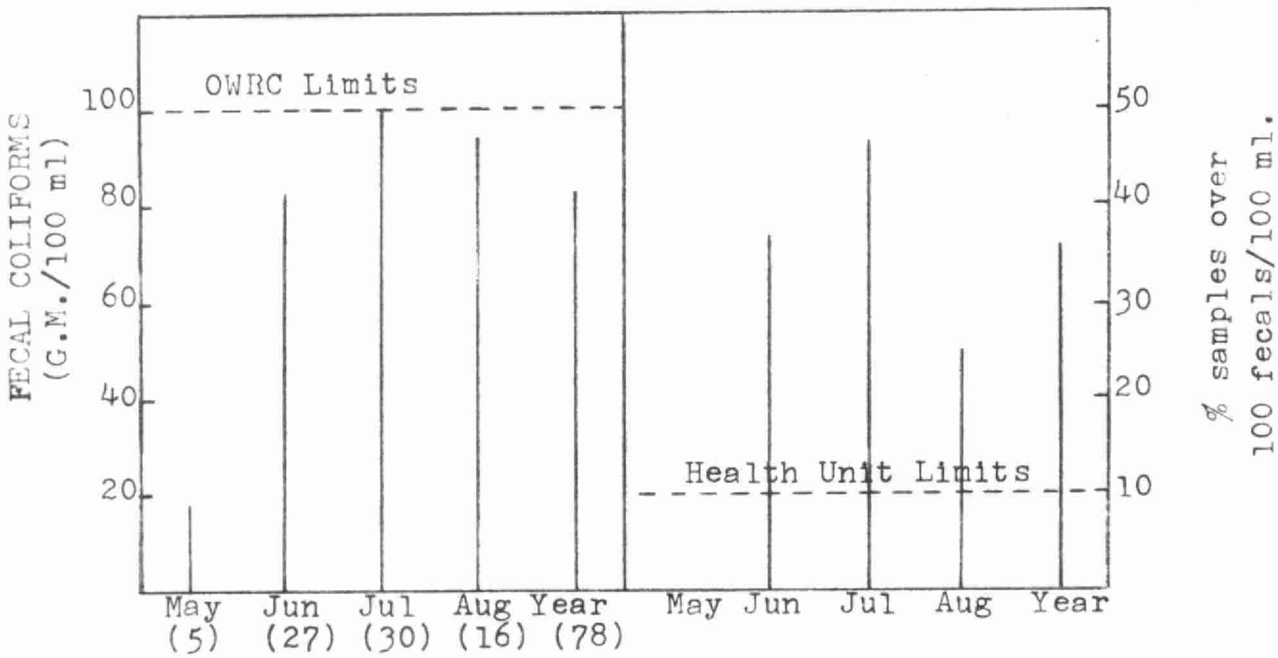


FIGURE 1.1c - BRANTWOOD BEACH

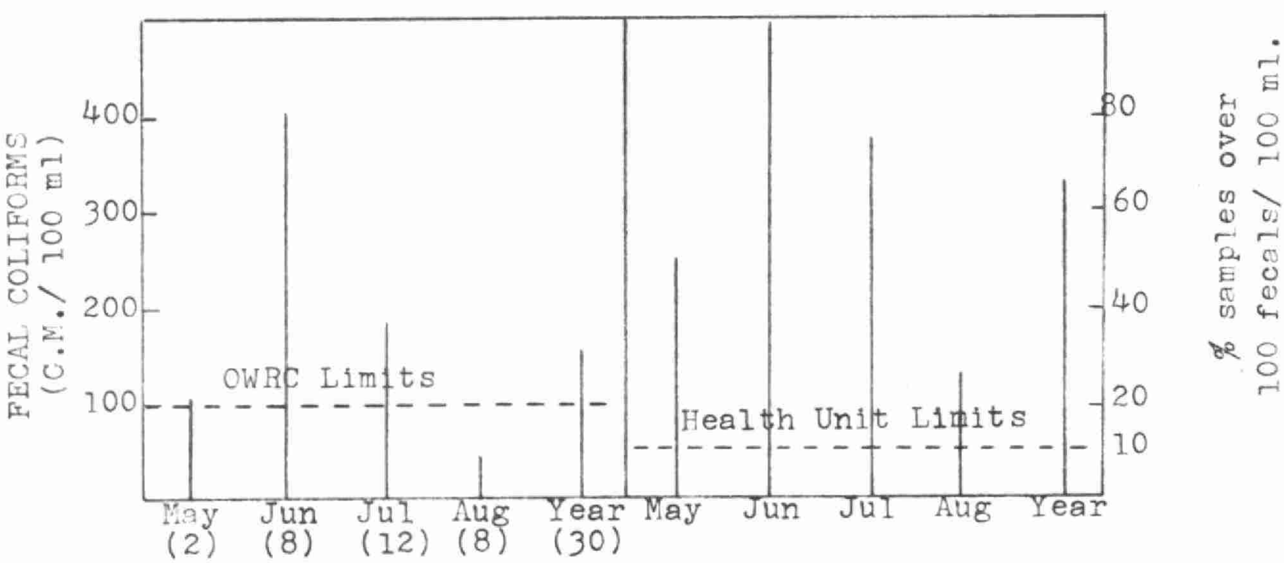


FIGURE 1.1d - STRATHCONA BEACH

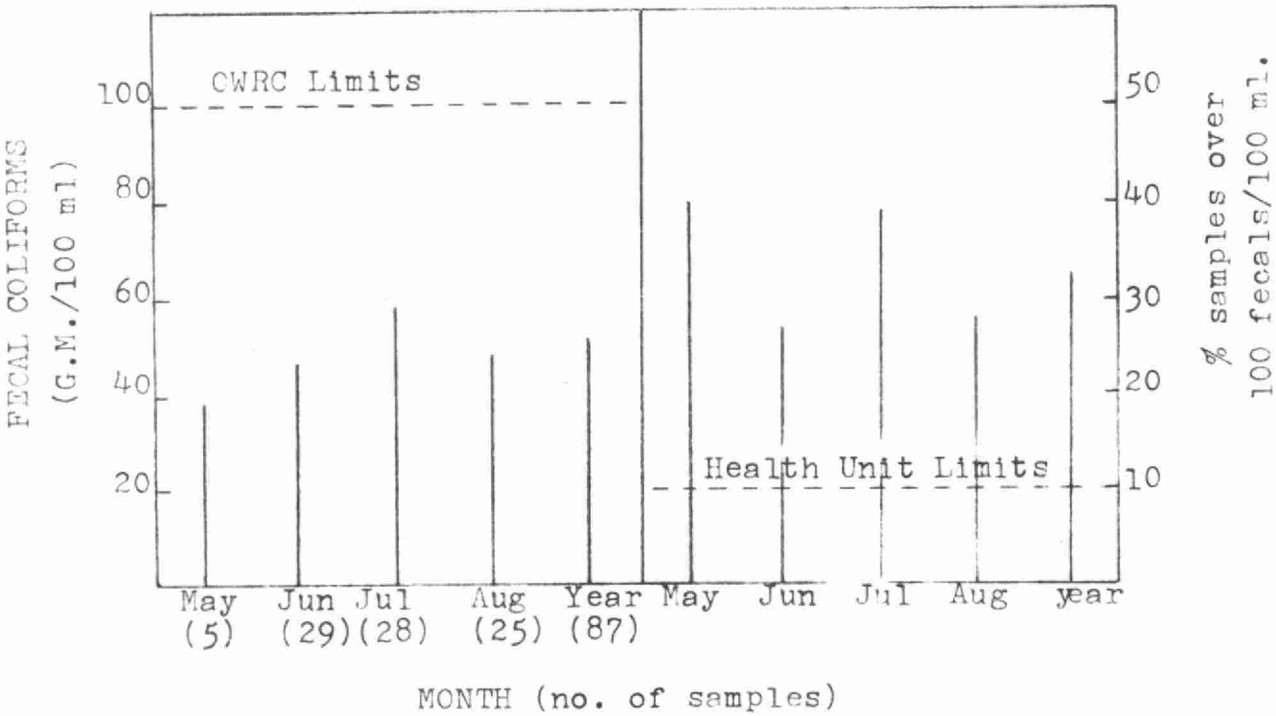


FIGURE 1.1e - BRITANNIA BEACH

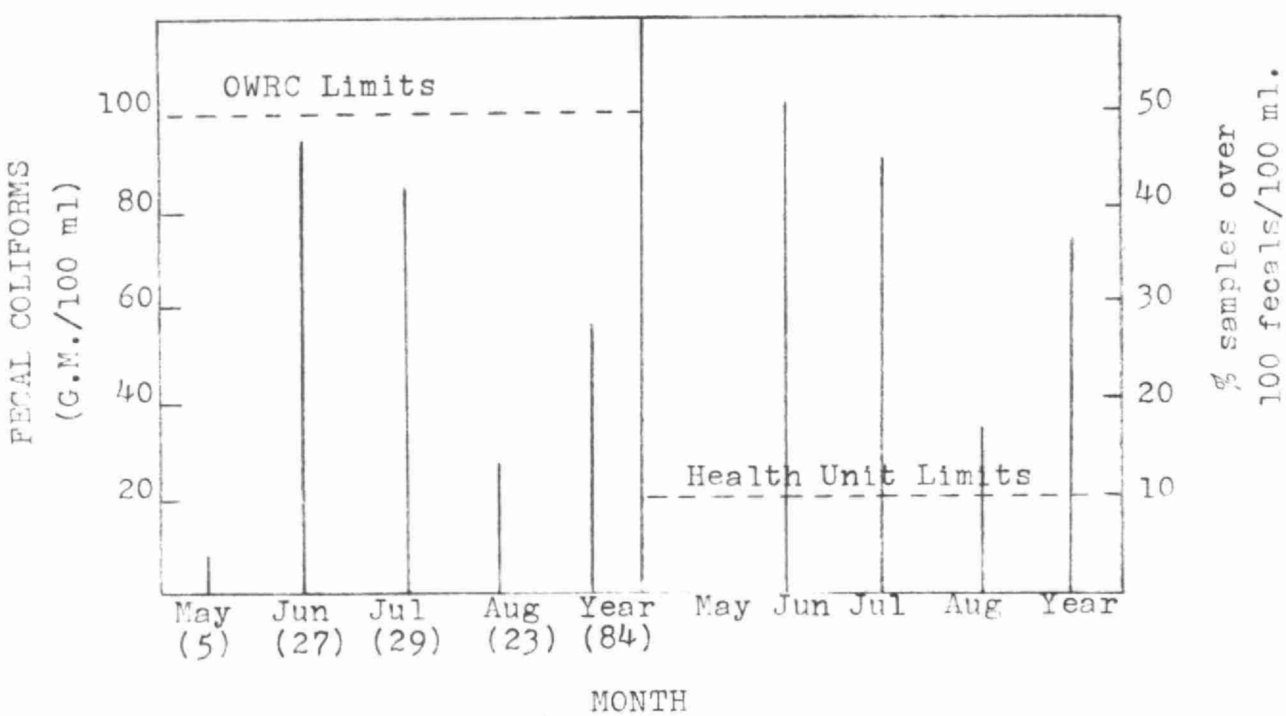


FIGURE 1.1f - WESTBORO BEACH

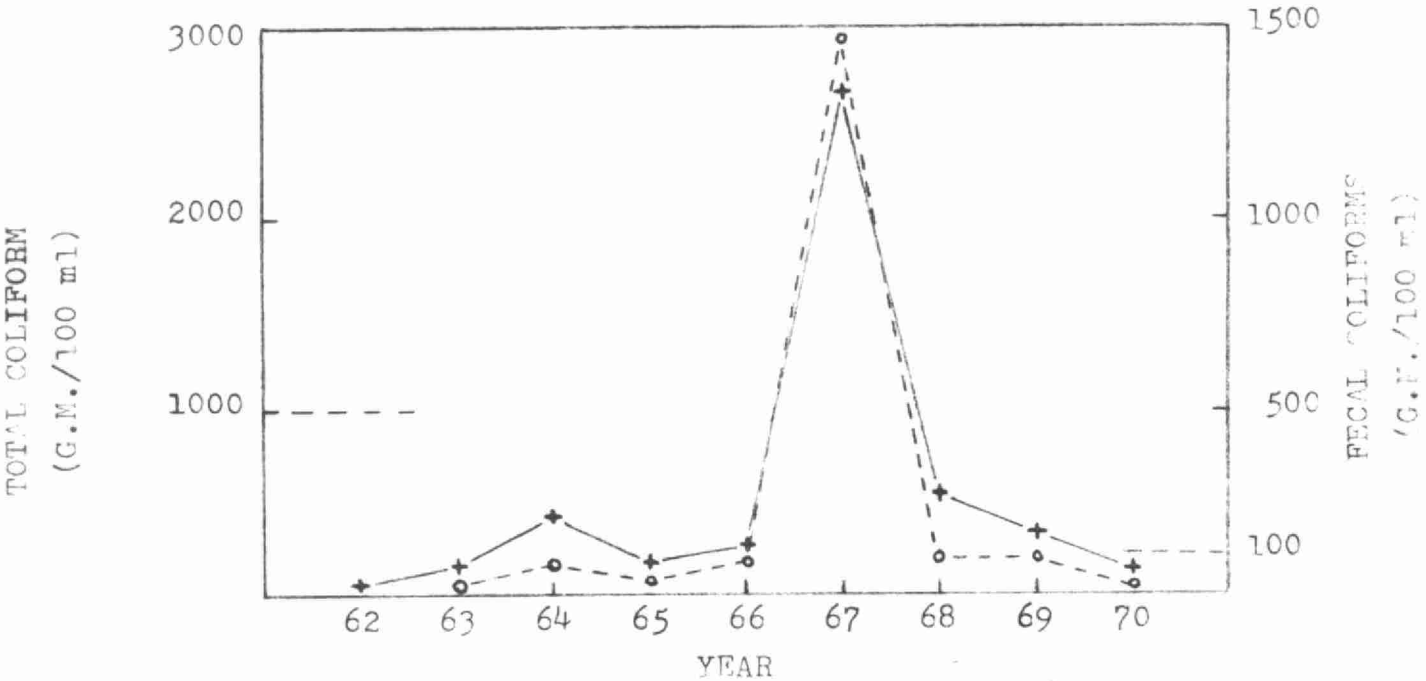


FIGURE 1.2a - Yearly data for MOONEY'S BAY BEACH. +, total; o, fecal coliforms: OWRC limits indicated

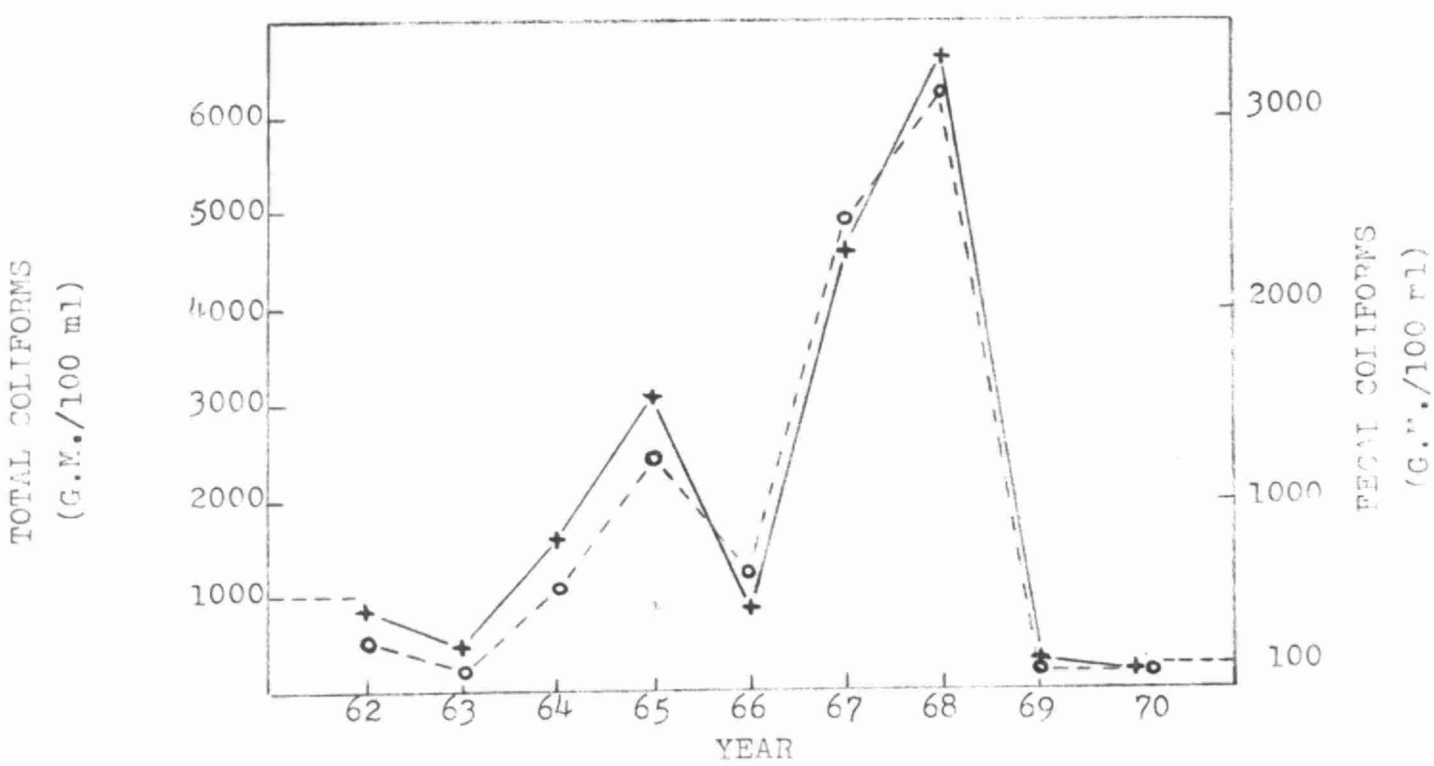


FIGURE 1.2b - Yearly data for BRIGHTON BEACH

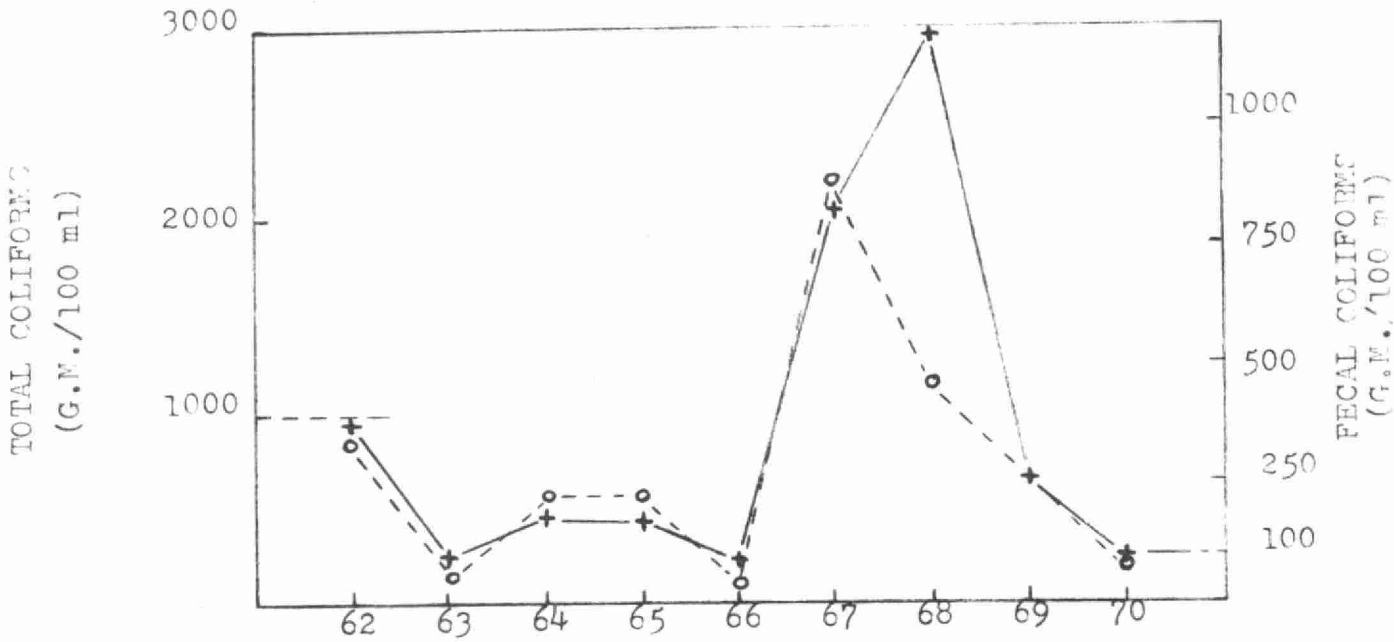


FIGURE 1.2C - Yearly data for BRANTWOOD BEACH. +, total; o , fecal coliforms; OWRC Limits indicated

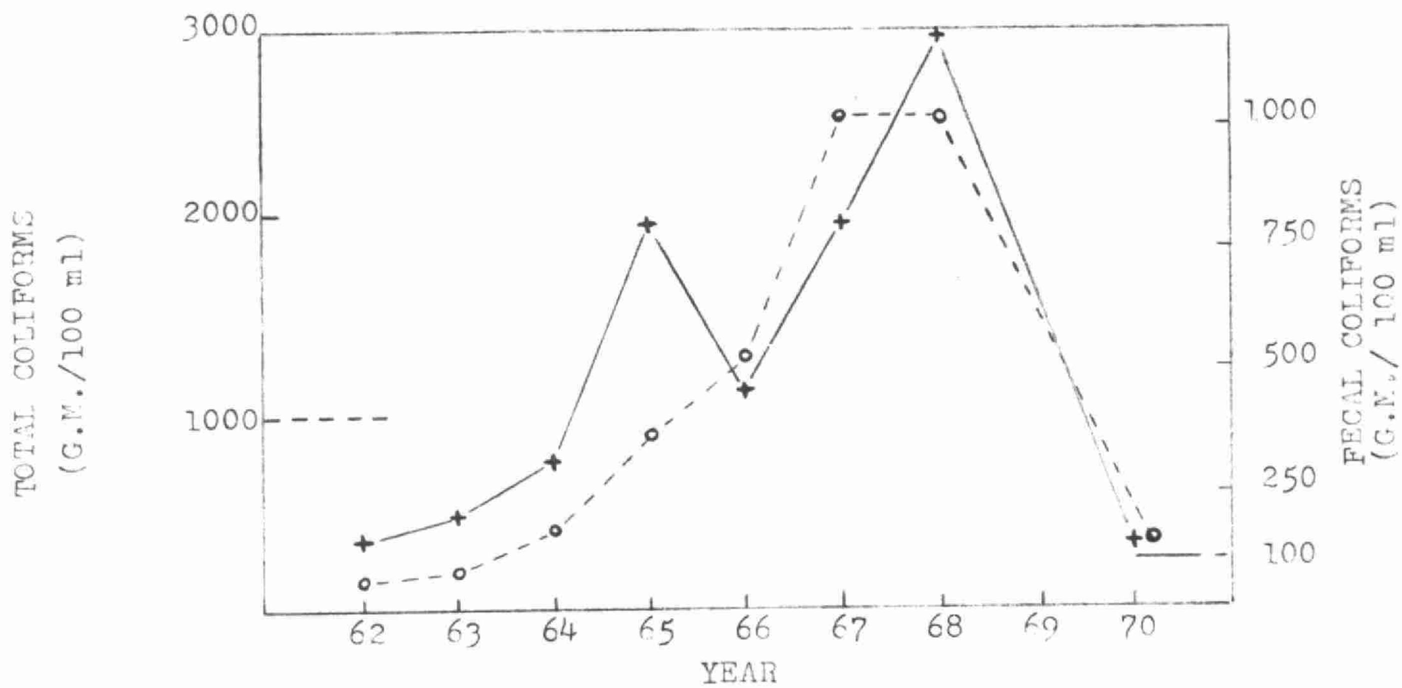


FIGURE 1.2d - Yearly data for STRATHCONA BEACH

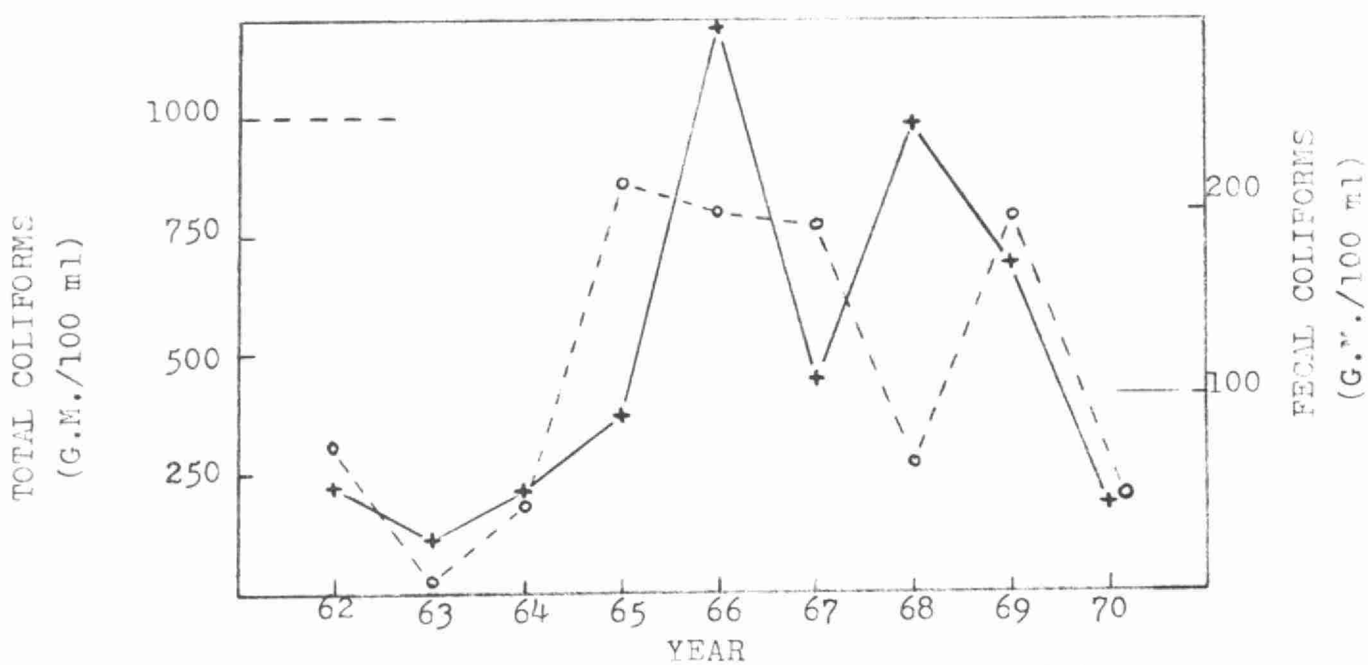


FIGURE 1.2e - Yearly data for BRITANNIA BEACH. +, total; o, fecal coliforms OWRC Limits indicated

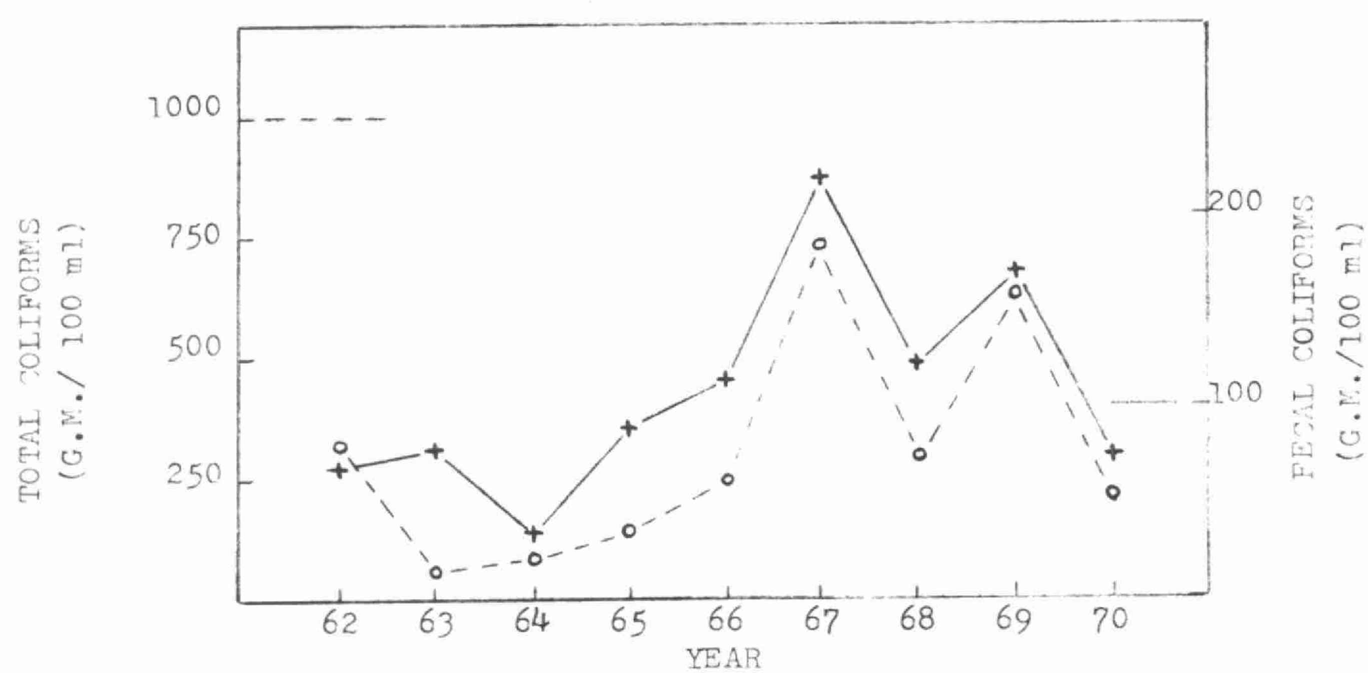


FIGURE 1.2f - Yearly data for WESTBORO BEACH

TABLE 1 - OCCURENCE OF EXCESSIVE BACTERIAL CONTAMINATION AT MOONEY'S BAY BEACH IN 1970

- ALL DATA ARE GEOMETRIC MEANS -

Date	Total Coliforms (per 100 ml)	Fecal Coliforms (per 100 ml)	No. of Samples
May 28th	2430	21.4	3
June 29th	2218	619	3
July 15th	1855	1443	3
July 17th	3000	2235	3
August 4th	510	370	3
August 19th	1232	577	3

TABLE 2 - OCCURENCE OF EXCESSIVE BACTERIAL CONTAMINATION AT BRIGHTON BEACH IN 1970

- ALL DATA ARE GEOMETRIC MEANS -

Date	Total Coliforms (per 100 ml)	Fecal Coliforms (per 100 ml)	No of samples
June 25th	3932	1203	3
July 22nd	1306	425	5
July 29th	1572	721	2
August 17th	+ 8000	+ 8000	2

TABLE 3 - OCCURENCE OF EXCESSIVE BACTERIAL CONTAMINATION AT BRANTWOOD BEACH IN 1970

Date	Total Coliforms (per 100 ml)	Fecal Coliforms (per 100 ml)	No of samples
July 22nd	3150	737	3
July 29th	1866	700	2
August 17th	+ 8000	2750	2
August 31st	2324	775	2

TABLE 4 - OCCURENCE OF EXCESSIVE BACTERIAL CONTAMINATION AT STRATHCONA BEACH IN 1970

- ALL DATA ARE GEOMETRIC MEANS -

Date	Total Coliforms	Fecal Coliforms	No. of samples
June 4th	806	529	2
June 11th	438	395	2
August 31st	+8000	3645	2

TABLE 5 - OCCURENCE OF EXCESSIVE BACTERIAL CONTAMINATION AT BRITANNIA BEACH IN 1970

- ALL DATA ARE GEOMETRIC MEANS -

Date	Total Coliforms (per 1oo ml)	Fecal Coliforms (per 100 ml)	No of samples
June 11th	524	495	3
July 27th	794	310	3
August 17th	568	415	3
August 31st	651	292	3

TABLE 6 - OCCURENCE OF EXCESSIVE BACTERIAL CONTAMINATION AT WESTBORO BEACH IN 1970

- ALL DATA ARE GEOMETRIC MEANS -

Date	Total Coliforms (per 100 ml)	Fecal Coliforms (per 100 ml)	No of samples
June 11th	1373	487	3
June 18th	2166	391	3
July 15th	2485	565	3
July 22nd	4711	1947	3

TABLE 7 - PRECIPITATION OVER THE REGIONAL MUNICIPALITY OF OTTAWA-CARLETON THROUGHOUT MAY, JUNE, JULY and AUGUST 1970 *

Date	Amount of Precipitation (in rainfall)	Date	Amount of Precipitation (in rainfall)
May 1st	0.04	July 4th	0.12
" 5th	0.5	" 5th	0.15
" 8th	0.05	" 9th	0.05
" 9th	0.18	" 10th	0.20
" 10th	0.57	" 11th	0.25
" 15th	0.10	" 14th	0.13
" 16th	0.54	" 15th	0.05
" 22nd	0.03	" 16th	0.70
" 25th	0.20	" 19th	0.33
" 26th	0.03	" 20th	1.62
" 31st	0.28	" 28th	0.25
June 2nd	0.06	" 30th	0.10
" 17th	0.23	" 31st	0.09
" 19th	0.26	Aug 1st	0.09
" 24th	0.23	" 11th	0.04
" 26th	0.26	" 16th	0.68
" 27th	0.03	" 19th	0.22
" 29th	0.08	" 20th	0.02
July 1st	0.09	" 26th	0.04
" 2nd	0.01	" 28th	0.05
" 3rd	0.04	" 30th	0.77

* From the Agrometeorology Section, Plant Research Institute, Research Branch, Canada Department of Agriculture.

CHAPTER 2 - REVIEW OF RESULTS OBTAINED ON THE RIDEAU RIVER BY THE WATER QUALITY SURVEYS BRANCH (OWRC)

The Water Quality Surveys Branch (WQSB) of the OWRC maintains several monitoring stations along the Rideau River. These are listed in Table 8 with part of the 1970 data. It is important to note that the values are reported as total coliforms per 100 ml.

As is quite evident from the data, the bacterial counts are not excessively high. The data for those months indicate that 92% of the samples contained fewer than 400 coliforms/100 ml. It is noted that no monitoring stations are operated between Black Rapids Dam and St. Patrick St. Bridge, ie. no data are available for that section of the Rideau River within the heavily-populated areas of the Regional Municipality of Ottawa-Carleton.

It is also evident that the high bacterial numbers introduced from municipal sewage treatment plants are diluted down and/or die off within a relatively short distance from the outfall. Readings at the Rideau Ferry Bridge show that the contaminating effect of the Perth Sewage lagoon discharge is minimal. Readings immediately below the Smiths Falls sewage treatment plant constitute the highest set of results for the year. These high bacterial numbers however die off by the time Merrickville is reached. The results at Burritt Rapids, Kars, and the Black Rapids Dam indicate that the water entering the Regional Municipality of Ottawa-Carleton is of good bacteriological quality.

TABLE 8 - WATER QUALITY SURVEY'S BRANCH BACTERIOLOGICAL RESULTS FOR THE RIDEAU RIVER

ALL VALUES EXPRESSED AS TOTAL COLIFORMS/100 ML

Stream Mileage	Location	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov.
0.2	Sussex Drive (East) Ottawa	40	3400	-	4	36	20	312	24	368	260	48
0.2	Sussex Drive (West) Ottawa	44	388	-	4	32	16	16	16	270	316	28
1.0	St. Patrick St Bridge, Ottawa	68	124	172	600	200	80	76	220	-	-	-
11.0	Black Rapids Dam	32	152	-	8	68	4	4	8	204	256	24
25.5	Bridge, at Kars	170	24	-	20	20	4	100	4	2800	88	8
42.0	Burritt Rapids Bridge	308	60	-	4	12	8	4	8	4	32	8
46.8	C.P.R. Bridge, Merrickville	448	196	-	4	4	36	4	16	152	4	128
47.3	Hwy 43 Bridge, Merrickville	600	404	-	8	4	8	4	4	4	4	68
60.2	Below Smiths Falls STP	$39x10^4$	612	-	3100	6700	12	28000	3800	3900	6700	16000
60.4	Above Smiths Falls STP	-	32	-	8	40	132	224	152	970	296	280
69.1	Rideau Ferry Bridge	16	-	152	-	4	4	60	8	4	4	12
74.6	Rockey Narrows	4	4	4	4	4	4	324	3700	-	56	-
82.4	Narrows Lock Bridge	4	4	4	4	4	8	216	4	4	-	76

CHAPTER 3 - SUMMARY OF THE 1970 BACTERIOLOGICAL RESULTS FOR THE RIDEAU RIVER OBTAINED BY THE POLLUTION CONTROL DIVISION OF THE REGIONAL MUNICIPALITY

This body of data complements the monitoring program of the WQSB in that the Pollution Control Division's sampling locations extend from the Black Rapids down to the Ottawa River. The results at Black Rapids, at the Mooney's Bay Area and at sites downstream of the Regional Municipality are presented in Table 9 as both total and fecal coliforms per 100 ml. The values reported are the geometric means of approximately ten samples collected through May, June, July and August.

These results show that both the total coliform and fecal coliform counts increase within the Regional Municipality of Ottawa-Carleton. Results at the upstream stations show that good quality water enters the heavily-populated area of the Regional Municipality. The data in the Mooney's Bay Area indicates that the good quality is sustained down to the first bathing beach. The beneficial effect of batch chlorinating both the Nepean and Uplands Creeks throughout the recreational season is quite evident. When results at the upstream and downstream stations are compared, it is observed that the total coliforms increase sevenfold while fecal coliforms increase in numbers by a factor of 13. The total coliforms/fecal coliforms ratio decreases from 7.5 at Black Rapids to 4.0 at the downstream stations.

These results, presented to provide a basis of comparison between the quality of water leaving the Regional Municipality with that entering the area through the Rideau River, lead to the conclusion that most of the bacterial pollution below the Black

Rapids enters the river from sources within the heavily-populated areas of the Regional Municipality. The fecal coliform results indicate that the pollution probably results from the entrance of domestic sewage into the waterway.

TABLE 9 - BACTERIOLOGICAL RESULTS FOR THE RIDEAU RIVER,

1970 DATA FROM POLLUTION CONTROL DIVISION

ALL VALUES ARE EXPRESSED AS GEOMETRIC MEAN/100 ML

Sampling Location	Total Coliforms	Fecal Coliforms
Upstream stations		
Black Rapids-East Bank	180	17
" " -Mid-Stream	140	29
" " - West Bank	220	26
Arithmetic mean	180	24
Centre		
Mooney's Bay Area-Northern Tip-East Bank	230	22
- Centre-West Bank	280	20
-Southern Tip-East Bank	205	18
-Southern Tip-Midstream	180	14
-Southern Tip-West Bank	180	17
Arithmetic mean	215	18
Downstream stations		
Cummings Bridge-East Bank	1220	300
" " -West Bank	1620	535
St. Patrick St Bridge-East Bank	1540	325
" " " " -West Bank	1040	340
Old Railway Bridge-East Bank	1290	215
" " " -West Bank	890	225
Arithmetic mean	1266	323

CHAPTER 4 - SUSPECTED SOURCES OF BACTERIAL POLLUTION FROM PREVIOUS AVAILABLE DATA COLLECTED OR RECEIVED BY THE OWRC

The suspected sources of pollution on the Rideau River are outlined in this section, The incriminating data is mostly from the Regional Municipality's Pollution Control Division; some of the data is from OWRC files. The data presented is from the furthest point upstream which is within that section of the Rideau River which receives the majority of the pollution affecting the area bathing beaches.

Table 10 indicates that the tributary streams are significant sources of pollution. Uplands Creek, Nepean Creek and Sawmill Creek in particular all have a history of consistently high bacterial counts. However, these streams' true relevance as pollution sources has to also be based on flow. This is discussed in the next Chapter.

TABLE 10 - SUSPECTED SOURCES OF BACTERIAL POLLUTION

1970 DATA

ALL RESULTS ARE EXPRESSED PER 100 ML

Tributary and Municipality	Agency Reporting (1)	Sampling Date	Location	Total Coliforms	Fecal Coliforms
Mud Creek (North Gower, Nepean Twps.)	PCD report 97-B	Sept 3rd	entry to Rideau R.	2,500	2,100
	Dist. Engr. Branch	Nov. 16th	at mouth	3,900	1,340
Jock River (Goulbourn, Nepean Twps; Village of Richmond)	PCD report 69-B	July 23rd	Hwy # 16	900	200
	WQSB	Nov. 15th	at mouth	800	416
	Dist. Engr. Branch	Nov. 16th	at mouth	750	340
Black Rapids Creek (Nepean Twp)	Dist Engr. Branch	Nov. 17th	Hwy # 16	1,700	292
Uplands Creek (City of Ottawa)	PCD report 30-B	June 23rd	at mouth	45,000	2,400
	Env. Health Centre	July 2nd	at mouth	21,000	530
	PCD report 56-B	July 28th	at mouth	5,200	2,300
	Dist Engr. Branch	Nov. 16th	at mouth	17,000	470
	Dist Engr. Branch	Nov. 17th	at mouth	4,400	316
Hunt Club Gully (City of Ottawa)	PCD report 28-B	June 16th	-	7,500	1,500
	PCD report 64-B	Aug. 11th	-	23,000	310
	PCD report 70-B	Aug. 25th	-	13,000	350

(1) PCD - Pollution Control Division of the Regional Municipality
Dist. Engr. Branch - District Engineers Branch, Sanitary Engineering, OWRC
WQSB - Water Quality Surveys Branch, Sanitary Engineering, OWRC
Env. Health Centre-Environmental Health Centre, Division of Public Health Engineering, Dept of National Health and Welfare

TABLE 10 - (Continued)

Tributary and Municipality	Agency Reporting (1)	Sampling Date	Location	Total Coliforms	Fecal Coliforms
Nepean Creek (Nepean Twp)	Dist. Engr. Branch	Apr 21st	Hwy # 16	4,200	1,300
	PCD report 31-B	June 15th	100 yds west Hwy 16	13,000	2,500
	PCD report 28-B	June16th	at mouth	12,000	2,000
	PCD report 64-B	August 11th	at mouth	21,000	8,000
	PCD report 70-B	Aug 25th	at mouth	4,000	530
	PCD report 89-B	Sept 23rd	at Merivale Rd	6,000	4,600
	Dist. Engr. Branch	Nov. 17th	Hwy # 16	652	408
Sawmill Creek (City of Ottawa, Gloucester Twp)	PCD report 33-B	June 18th	at Rideau River	4,100	1,400
	PCD report 45-B	July 2nd	at Rideau River	1,700	270
	PCD report 65-B	Aug. 20th	at Rideau River	4,500	670
	PCD report 71-B	Aug. 27th	at Rideau River	1,300	270
	Dist. Engr. Branch	Nov. 18th	150' from Rideau River	3,400	756

CHAPTER 5 - RESULTS OF A SAMPLING PROGRAM ON THE RIDEAU RIVER BELOW LONG ISLAND DURING THE WEEK OF NOV 16, 1970

A sampling program was carried out during the week of November 16, 1970 on the Rideau River by the District Engineers Branch of the Division of Sanitary Engineering, OWRC. The purposes of this sampling program were:

1) To determine the relative importance of streams discharging into the Rideau River with respect to bacterial contamination.
2) To determine which, if any, of the storm sewers and drains discharging into the Rideau River contribute severe bacterial contamination. The correlation between rainfall and high bacterial counts obtained at the four beaches in 1970 (Chap.1) had already implicated storm sewer discharge as a severe bacterial contaminant.

5.1 - STREAM RESULTS

Table 11 presents the results of stream sampling and gauging carried out during the week of Nov. 16, 1970. In general, the flows were measured on the days that the bacteriological samples were taken. The results indicate that the major tributaries of the Rideau River below Long Island are Mud Creek, the Jock River, Gloucester Creek, Black Rapids Creek, Nepean Creek & Sawmill Creek.

The relative importance of each input can be estimated by considering the dilution effect of the river. If an arbitrary value of 950 cfs is assumed for the Rideau River at a point immediately above the Jock River (*) and no account is made of bacterial survival times in cold water, the following equation can be used to estimate stream effect:

* 950 CFS WAS THE MEAN FLOW VALUE RECORDED FOR NOVEMBER 1968; INLAND WATERS BRANCH OF THE DEPARTMENT OF ENERGY, MINES & RESOURCES; FOR PRESENT PURPOSES THIS VALUE NEED NOT BE EXACT.

$$Cx = \frac{C1\,F1 + C2\,F2}{F1 + F2} \quad \ldots\ldots\ldots\ldots\ldots \quad (1)$$

where

Cx = Bacterial content downstream from confluence of the tributary with the river (fecals/100 ml)

$C1$ = Bacterial content of the river upstream of the confluence (fecals/100 ml)

$F1$ = River flow above confluence (cfs)

$C2$ = Bacterial content of the discharging tributary (fecals/100 ml); available from Table 11.

$F2$ = Tributary flow above confluence with river (cfs)

There is no reliable data for fecal content in the Rideau River at all points immediately upstream of each tributary. Two values of C1 (90 and 150 fecals/100 ml) have been chosen somewhat arbitrarily. For purposes of calculation, the fecal counts obtained in the tributary itself are maintained throughout. The results then, based on one or two days of sampling and one determination of flow capacity, are subject to quite definite limitations. The results are of value in determining the <u>relative</u> importance of each tributary as a source of bacterial contamination.

Tables 12a and 12b contain the calculated values of downstream bacterial concentrations. The relative increase over the arbitrary basal level has been included.

The results indicate that the tributaries causing the most bacterial contamination of the Rideau River are (1) the Jock River, (2) Gloucester Creek, and (3) Black Rapids Creek. Because these tributaries are relatively far from the bathing beach areas (Mooney's Bay) the high bacterial loads introduced

at these tributaries would not exert a significant effect on water quality at those areas. The results obtained by the Pollution Control Division (Chap. 3) show that the bacteria introduced at the aforementioned tributaries do not survive to reach the Mooney's Bay area. It is also not unlikely that the relatively high fecal counts in these tributaries in the month of November are due to the increased level of the water table in an agricultural watershed. Both Gloucester and Black Rapids Creek drain land which is used primarily for agricultural purposes. Controlling the bacterial contamination from these tributaries would represent a major difficulty in controlling bacterial levels in the Rideau River. The forthcoming installation of a sewage treatment plant at the Village of Richmond can be expected to substantially improve water quality in the Jock River. At the present, sewage disposal in that municipality is effected through treatment in septic tanks.

Nepean and Sawmill Creeks both assume a degree of importance dependent upon their proximity to the beach areas. Previous attempts at controlling bacterial input from Nepean Creek by batch chlorination have had a definite beneficial effect on the bacteriological quality at Mooney's Bay Beach (Chap 1 & 3). Sawmill Creek quite probably affects the bacteriological levels at Brighton and Brantwood Beaches. Attempts should definitely be directed towards improving the quality of these two tributaries on a permanent basis as the bacterial levels in these streams suggest very strongly the entry of domestic wastes. These wastes, besides exerting the obvious effect on the bacterial levels, also accelerate the process of eutrophication in the Rideau River.

The requirement for a program of co-operative effort directed at establishing the direct causes of contamination on these streams is evident. Dye testing for connected sewage lines to storm sewers should be the first item of priority.

TABLE 11 - BACTERIAL CONTAMINATION FROM STREAMS DISCHARGING INTO THE RIDEAU RIVER (BELOW LONG ISLAND)

ALL COUNTS ARE PER 100 ML.

Stream	1970 Date	Flow (cfs)(1)	Total Coliforms	Fecal Coliforms
Mud Creek	Nov 17	13.2	320	140
Jock River	Nov 16	100 (2)	750	340
Gloucester Creek (2.2 miles downstream of Jock River, east side)	Nov 16	17.8	3,900	1,340
	Nov 17		1,190	900
Creek(2000' south of Jnct. Merivale-Hwy 16) (Nepean Twp)	Nov 16	3.9	140	20
Balmoral Dr. Creek (Gloucester Twp)	Nov 17	2.4	270	90
Creek(3000' south of Black Rapids) (Nepean Twp)	Nov 16	0.5	1,080	570
Black Rapids Creek	Nov 16	17.5	9,000	1,920
	Nov 17		1,700	292
Uplands Creek	Nov 16	1.9	17,000	470
	Nov 17		4,400	316
Nepean Creek	Nov 17	17.4	652	408
Sawmill Creek	Nov 18	5.8	3,400	756

(1) these flows were measured with an Ott Flow Meter

(2) this flow is from OWRC Water Resources Bulletin 3-4, Surface Water Series, 1969.

TABLE 12.a - CALCULATED VALUES OF BACTERIAL CONCENTRATIONS DOWNSTREAM FROM TRIBUTARIES ON THE RIDEAU RIVER (EQUATION (1)

Cl = 90 fecals/100 ml.
Fl = 950 cfs (above Jock River)

TRIBUTARY	Cx (fecals/100 ml)	$\frac{Cx-Cl}{Cl}$ (%)
Mud Creek	91.4	1.6
Jock River	123.0	26.2
Gloucester Creek	107.0	18.8
Creek(above Merivale)	90	0.0
Balmoral Dr. Creek	90	0.0
Creek (above Black Rapids)	91	1.1
Black Rapids Creek	106	17.7
Uplands Creek	91	1.1
Nepean Creek	95	5.6
Sawmill Creek	95.2	5.8

TABLE 12-b - CALCULATED VALUES OF BACTERIAL CONCENTRATIONS DOWNSTREAM FROM TRIBUTARIES ON THE RIDEAU RIVER (EQUATION (1))

C1 = 150 fecals/100 ml.

F1 = 950 cfs (above Jock River)

Tributary	Cx (fecals/100 ml)	$\frac{Cx-C1}{C1}$ (%)
Mud Creek	148	-
Jock River	168	12
Gloucester Creek	166	10.6
Creek(above Merivale)	150	0.0
Balmoral Dr. Creek	151	0.5
Creek (Above Black Rapids)	151	0.5
Black Rapids Creek	165	10.
Uplands Creek	151	0.5
Nepean Creek	154	2.6
Sawmill Creek	154	2.6

5.2 - STORM SEWER AND DRAIN RESULTS

Table 13 summarizes the data collected on the storm sewer and drains discharging into the Rideau River. In general, the readings at an upstream station are compared to the readings both opposite and below the outfall. In some cases, a single reading opposite the outfall was the only sample collected. All the samples, unless otherwise indicated, were taken directly from the Rideau River. As the majority of outlets were partly below water level, few samples were collected directly from the outfall line. It is quite probable that direct river sampling has provided a better basis of comparison with upstream and downstream stations. The results do not fully account for dilution or current movements. In some instances, it was difficult to estimate whether any flow was discharging from the outfalls; no data is reported for outfalls that were visibly not discharging.

On that table, stations 1 through 8 would directly affect bacteriological quality at Mooney's Bay Beach. The points of bacterial entry of particular significance include the Uplands STP, a 54" storm sewer from Walkley Rd. and a 42" storm sewer from Riverside Dr. (station 8). A one run sampling program cannot conclusively establish how much pollution emanates from the other outfalls.

Stations 9 through 25 are significant with respect to bacterial pollution at Brighton Beach and possibly also at Brantwood Beach. Stations 9,10,12,13,22,24 and 25 appear to be the points of maximum bacterial concentration. Station 14, 14a, 15,19 also yield results slightly higher than the basal levels established for that section of the Rideau River. Stations

18 through 25 would have a direct effect on Brighton Beach as they are closest to the beach area.

Stations 26 through 29, and possibly 30 would increase the pollution contamination at Brantwood Beach by adding to the bacterial content already reaching Brighton Beach from Stations 9 through 25. It would appear that stations 27 and 29 are the most concentrated sources in this group. It is quite evident that Brighton and Brantwood Beaches suffer the effects of being downstream from a section of the Rideau River into which at least twenty outfalls(overflows,storm sewers or catch basins) discharge.

Stations 31 through 41 would increase bacterial counts at Strathcona Beach. Of these, Stations 31,33,35,36,37 and 38,39 appear to be the worse sources of bacterial contamination. These outfalls,however, are relatively well spread out over that section of the Rideau River so that the pollution load at Strathcona Beach should be somewhat lessened. Stations 31 and 37 would greatly fluctuate as to the amount of contamination discharged. Below Strathcona, stations 42 and 43 are quite clearly regions of high bacterial concentrations for that section of the river.

Stations 4,17,20,23,28,30 and 32 are overflow outfalls. Significantly, not a single one of these stations represents a point of high bacterial concentration. There are two aspects to this observation. Firstly, and if it is accepted that a large majority of the pollution affecting the four bathing beaches originates below Black Rapids, it appears that the severest sources of bacterial pollution are the storm sewers. Catch basins are neglected for lack of information regarding 'uncontaminated' urban runoff. It is most likely that a great many of these storm

sewers are either badly contaminated from unknown causes or actually serve as sanitary sewers because of cross-connections of sewer services made to them. That the high bacterial counts obtained at these storm sewer outfalls were obtained during relatively dry weather indicates that these storm sewers are quite probably discharging continuously. The second point worth noting is that the bacterial load on the waterway would be even more severe during periods of wet weather when discharges from the overflow outlets could be expected. There can be very little doubt that rainfall would make pollution sources within the Regional Municipality of even greater importance with respect to bacterial pollution at the four beaches on the Rideau River.

TABLE 13 - BACTERIOLOGICAL RESULTS ON RIDEAU RIVER RELATED TO STORM SEWER AND DRAIN OUTFALLS

All counts are reported per 100 ml.

All samples, unless otherwise indicated, were obtained directly from the river.

All sites, unless otherwise indicated, are within the City of Ottawa.

Location, Description and Municipality	Date	Total Coliforms	Fecal Coliforms
1 Carleton Lodge STP	Nov 16	10(chlorinating)	10
1a 200' upstream of 1	Nov 16	408	160
1b 200' downstream from 1 (Nepean Twp)	Nov 16	432	216
2 12" outfall from Riverside Dr (originates within airport limits)	Nov 16	276	264
2a 1000' upstream of 2 (City of Ottawa)	Nov 16	270	90
3 Uplands STP	Nov 16	1040	316
3b 100' downstream from 3	Nov 16	880	360
4 10" overflow Revelstroke Dr.	Nov 16	212	108
5 24" storm sewer from Revelstroke and Riverside Dr.	Nov 17	448	200
5a 100' upstream of 5	Nov 17	244	128
5b 100' downstream from 5	Nov 17	292	168
6 54" storm sewer, from Walkley Rd.	Nov 17	9700	1600
6a 150' upstream from 6	Nov17	300	160
7 24" storm sewer, below 6, from Riverside Dr.	Nov 17	284	176
8 42" storm sewer (into ditch) below 7, from Riverside Dr.	Nov 17	352	264
8a 100' upstream of 8	Nov 17	220	188
8b 100' downstream from 8	Nov 17	516	220
9 8" outfall, south 50' below Hog's Back Dam	Nov 17	12900	284
10 48" storm sewer, at Heron Rd Bridge, east side	Nov 17	2700	412
10a 100' upstream of 10	Nov 17	220	116
10b 100' downstream from 10	Nov 17	300	216

	Location, Description and Municipality	Date	Total Coliforms	Fecal Coliforms
11	outfall from Carleton University (north)	Nov 18	<4(chlorinating)	<4
11a	100' upstream of 11	Nov 18	116	104
11b	150' downstream of 11	Nov 18	104	72
12	48" outfall 200' upstream of George Dunbar Bridge(south)	Nov 17	512	300
12a	100' upstream of 12	Nov 17	200	136
12b	100' downstream from 12	Nov 17	312	228
13	21" outfall, at George Dunbar Bridge, east side	Nov 17	300	210
14	36" outfall,200' east of 13	Nov 17	9100	7300
14a	36" outfall,700' east of 13 east side	Nov 17	256	172
15	36" outfall,50' upstream of George Dunbar Bridge, north side	Nov 19	124	88
15a	100' upstream of 15	Nov 19	124	84
15b	100' downstream of 15	Nov 19	240	184
16	36" outfall through Brewer Park	Nov 19	124	48
16a	50' upstream of 16	NOv 19	108	52
17	30' overflow from Leonard St	Nov 19	48	44
18	27" catch basin,700' upstream of Billings Bridge,southern shore	Nov 18	168	136
18a	upstream of 18	Nov 18	228	152
19	24" catch basin,300' upstream of Billings Bridge,southern shore	Nov 18	124	108
19b	50' downstream from 20	Nov 18	192	116
20	30" overflow from Harvard St. (north side)	Nov 18	152	88
21	18" catch basin,300' downstream from Billings Br.(south side)	Nov 18	96	84

	Location, Description and Municipality	Date	Total Coliforms	Fecal Coliforms
22	24" catch basin, 700' downstream from Billings Bridge, from Riverside Drive	Nov 18	1130	620
23	36" overflow from Riverdale (north side)	Nov 18	188	84
24	18" storm sewer from Pleasant Park Rd (south side)	Nov 18	10 (chlorine)	10
24a	30" storm sewer from Billings Ave.	Nov 18	284	172
25	24" storm sewer, 500' east of 24	Nov 18	220	176
26	48" storm sewer, 150' downstream of Smyth Rd. Bridge, south side	Nov 18	200	80
26a	200' upstream of 26	Nov 18	176	140
27	30" storm sewer, 500' east of Smyth Rd Bridge south side	Nov 18	212	148
28	24" overflow from Centennial Boulevard, north side	Nov 18	96	84
		Nov 19	100	44
29	72" storm sewer, across from Centennial Blvd, south shore	Nov 18	316	208
30	42" overflow from Clegg St. north shore	Nov 18	164	100
31	26" outfall, Algonquin College	Nov 18	3400	1900
32	30" overflow and 66" storm sewer from Springhurst Ave. (north side)	Nov 18	16	12
33	54" outfall from Lees Ave.	Nov 18	188	160
34	48" storm sewer, 500' upstream of Hurdman Bridge, east side	Nov 19	152	36
		Nov 18	120	70
34a	100' upstream of 34	Nov 19	44	4
34b	50' downstream of 34 (at 36" outfall	Nov 19	132	84

	Location and Description and Municipality	Date	Total Coliforms	Fecal Coliforms
35	78" storm sewer south of Hurdman Bridge (east side)	Nov 18	168	152
36	78" storm sewer, south of Hurdman Bridge(west side)	Nov 19	2100	144
37	Development site north of Hurdman Bridge (east side)	Nov 19	2500	800
38	12" catch basin from Wright St.	Nov 18	156	156
39	72" storm sewer from Drouin Ave.	Nov 18	340	244
40	60" storm sewer south of Olga St.	Nov 18	84	8
40b	100' downstream of 40	Nov 18	260	176
41	36" storm sewer from Stevens St.	Nov 18	236	72
42	9" outfall from Charlotte St. and Laurier Ave.	Nov 18	248	112
42a	upstream of 42	Nov 18	176	28
43	18" storm sewer from St. Patrick St.	Nov 18	164	104

CHAPTER 6 - RESULTS OF A WATER QUALITY SURVEYS BRANCH INVESTIGATION OF BACTERIOLOGICAL LEVELS IN THE OTTAWA RIVER NOVEMBER 15, 1970.

The purpose of this investigation was to establish the general pattern of bacterial distribution in the Ottawa River. This Chapter should be considered analogous to Chapter 2 concerning the Rideau River. The results obtained are summarized in Table 14.

The results indicate that the Ottawa River above Watt's Creek is free of severe bacterial pollution. The results also indicate the severity of bacterial contamination emanating from the Watt's Creek. The high counts obtained at the mouth of the Creek are most certainly due to effluent discharge from the Watt's Creek Sewage Treatment Plant. Samples taken below Watt's Creek indicate that the bacterial levels in the river do not revert to the values found above the Creek. The reader will recognize the limitations of a one run sampling program. The conclusion that bacterial pollution in the Ottawa River is not significant for the section of the river immediately above the Nepean Township limits is well-documented. A forthcoming Water Quality Surveys Branch report on the whole Ottawa River presents quite definite evidence supporting the conclusion.

It should be noted that due to high flows the Watt's Creek Sewage Treatment Plant was being by-passed on the weekend of the sampling period. This would account for the high bacterial counts even though at this time chlorine was being applied to the plant effluent. Final plans for expansion of the Watt's Creek Sewage Treatment Plant have now been approved by the OWRC and construction will soon commence.

TABLE 14 - RESULTS OF W.Q.S.B. INVESTIGATION OF OTTAWA RIVER

NOVEMBER 15, 1970

Location	Total Coliforms (per 100 ml.)	Fecal Coliforms
1000' upstream of Watt's Creek(north)	24	4
1000' upstream of Watt's Creek(south)	100	4
Watt's Creek at mouth	2900	1500
Opposite Westboro Beach (north)	92	32
Opposite Westboro Beach (centre)	108	36
Opposite Westboro Beach (south)	156	84
Chaudiere Bridge (south channel)	92	36
Chaudiere Bridge (north channel)	196	64

CHAPTER 7 - RESULTS OF A SAMPLING PROGRAM ON THE OTTAWA RIVER BELOW SHIRLEY'S BAY DURING THE WEEK OF NOV. 23, 1970.

This sampling program, carried out by the District Engineers Branch of the Division of Sanitary Engineering, had purposes analogous to those of the Rideau River program of the week of November 16, 1970.

Table 15 contains a summary of the investigation results.

These results show that Britannia Beach is probably influenced by the various tributaries upstream. The most serious source of pollution is quite likely Watt's Creek and the results indicate this. The readings at Graham and Stillwater Creeks indicate serious contamination from the two tributaries. The readings obtained at Britannia Beach are all significantly higher than readings obtained throughout the recreational period. The bacteriological levels at the Britannia W/W indicate that regions of shoreline exposed to free flow of the Ottawa River may be less liable to bacterial pollution. The readings obtained here may also imply that bacterial levels at Westboro Beach over the levels obtained at Station 10 may be due to local sources of pollution.

Stations 11 through 24 are all potential sources of bacterial contamination of Westboro Beach. The most serious of these appear to be at Stations 14,15,17,18,21 and 22. The results at the beach itself are not typical of readings obtained throughout the recreational season. Stations 17 through 24 are particularly important due to their proximity to the bathing area. These would be particularly serious in times of rainfall

as the stations are all storm sewers or catch basins. Results at Stations26 through 30 are of no consequence to the bacteriological quality at Westboro Beach but do indicate how the 60" storm sewer from Pontiac St. could affect the water quality at Remic Beach.

TABLE 15 - RESULTS OF OTTAWA RIVER INVESTIGATION
WEEK OF NOVEMBER 23, 1970

All counts are reported per 100 ml.

All samples, unless otherwise indicated, were obtained directly from the river.

All sites, unless otherwise indicated, are within the City of Ottawa.

	Location, Description and Municipality	Date	Total Coliforms	Fecal Coliforms
1	Shirleys Brook (Nepean Twp)	Nov 25	292	232
2	Watt's Creek (Nepean Twp)	Nov 25	2,100	1,100
3	Stillwater Creek (Nepean Twp)	Nov 24	356	240
4	Graham Creek (Nepean Twp)	Nov 24	11,700	9,700
5	Ditch from Birchdale Ave. (at Ottawa R.)	Nov 25	1,300	612
6	Britannia Bch(on breakwall)	Nov 25	1,200	492
7	Britannia Bch(near breakwall)	Nov 25	1,900	648
8	Britannia Bch(midbeach)	Nov 25	1,500	284
9	Britannia Bch(downstream)	Nov 25	2,200	580
10	At Britannia W/W	Nov 25	84	44
11	Pinecrest Creek	Nov 25	432	256
12	27" outfall from New Orchard	Nov 25	24	8
12a	100' upstream of 12	Nov 25	192	64
12b	100' downstream of 12	Nov 25	168	88
13	36" storm sewer from Elder St	Nov 25	72	36
14	60" storm sewer from Cleary St	Nov 24	8,500	8,500
15	12" outfall,100' below 14	Nov 24	9,600	8,500
16	72" storm sewer from Wavell Ave.	Nov 24	632	272
17	24" outfall from Mansfield Ave.	Nov 24	10,300	+ 600
18	48" into ditch,from Fraser Ave.	Nov 24	-	+ 600
19	12 outfall,100' below 18	Nov 24	300	268
20	36" storm sewer from Broadview Ave.	Nov 24	292	256

21	30" outfall from along Broadview Ave.	Nov 24	1,200	552
22	30" outfall downstream of 21	Nov 24	1,800	472
23	12" catchbasin immediately upstream of Westboro Bch.	Nov 24	408	228
24	30" outfall from Workman St	Nov 24	196	184
25	Westboro Beach (upstream)	Nov 24	428	256
25a	Westboro Beach (middle)	Nov 24	232	216
25b	Westboro Beach (downstream)	Nov 24	356	244
26	60" storm sewer from Churchill Avenue	Nov 24	220	180
27	60" storm sewer from Pontiac St.	Nov 24	5,600	692
27a	Upstream of 27	Nov 24	292	140
28	Remic Beach (upstream)	Nov 24	168	124
28b	Remic Beach (downstream)	Nov 24	136	132
29	21" outfall leading into ditch (from Northwestern Ave)	Nov 24	232	220
30	Remic Rapids Lookout	Nov 24	208	192

CHAPTER 8 - ESTABLISHMENT OF AN OWRC SAMPLING PROGRAM DESIGNED TO INVESTIGATE THE BACTERIOLOGICAL QUALITY OF THE RIDEAU AND OTTAWA RIVERS

The sampling programs of the weeks of November 16th and November 23rd, 1970 constituted the first of a series of programs to be carried out on the Rideau and Ottawa Rivers with a view to improving the quality of water at the bathing beaches.

A significant amount of data collected over the first sampling interval has not been included in the present report. This data will be added to newer data to be collected throughout the year 1971 so that a reliable composite view of the situation may be formed. It is intended to continue the process of intensive sampling on both waterways.

The OWRC will issue specific recommendations to the Regional Municipality of Ottawa-Carleton and constituent municipalities in addition to those made in the present report. These recommendations will be issued whenever the OWRC sampling program reveals the need for corrective measures to be taken.

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APPENDIX A

MONTHLY GEOMETRIC MEANS OF TOTAL AND FECAL COLIFORMS

AT THE SIX BATHING BEACHES DISCUSSED.

MOONEY'S BAY BEACH

- MONTHLY 1970 GEOMETRIC MEANS -

Month	Geometric Mean per 100 ml: Total Coliforms (No of samples in brackets)	Fecal Coliforms
May	276.3 (7) *	36.1 (9)
June	137.3 (28)	42.5 (28)
July	91.5 (33)	40.8 (33)
August	173.9 (22) **	77.0 (22) **

* excluding two 1,100+ total coliform values

** excluding 80+ total coliform and 80+ fecal coliform.

BRIGHTON BEACH

- MONTHLY GEOMETRIC MEANS 1970 -

Month	Geometric Mean per 100 ml. Total Coliforms (No. of samples in brackets)	Fecal Coliforms
May	319.4 (6)	24.5 (6)
June	365.4 (26)	145.7 (26)
July	367.6 (29)	125.0 (29)
August	131.6 (9) *	91.8 (9) *

* two 8000+ total coliform and fecal coliform counts per 100 ml are excluded.

BRANTWOOD BEACH

- MONTHLY 1970 GEOMETRIC MEANS -

Month	Geometric Mean per 10o ml	
	Total Coliforms	Fecal Coliforms
	(No. of samples in brackets)	
May	274.4 (5)	18.6 (5)
June	176.2 (27)	82.7 (27)
July	257.4 (28) *	99.8 (30)
August	144.3 (14)	94.0 (16)

* two 8000 + total coliform counts were excluded.

STRATHCONA BEACH

- MONTHLY 1970 GEOMETRIC MEANS -

Month	Geometric Mean per 100 ml. Total Coliforms (No. of samples in brackets)	Fecal Coliforms
May	216.3 (2)	109.5 (2)
June	573.2 (8)	401.8 (8)
July	488.4 (12)	182.5 (12)
August	100.9 (6) *	46.8 (8)

* This mean excludes two values of 8000 + total coliforms per 100 ml sample, which were collected after a rain.

BRITANNIA BEACH

- MONTHLY 1970 GEOMETRIC MEANS -

Month	Geometric Mean per 100 ml — Total Coliforms (No. of samples in brackets)	Fecal Coliforms
May	216.9 (5)	39.8 (5)
June	173.5 (29)	47.5 (29)
July	204.0 (28)	59.8 (28)
August	179.4 (25)	48.7 (25)

WESTBORO BEACH

- MONTHLY 1970 GEOMETRIC MEANS -

Month	Geometric Mean per 100 ml. Total Coliforms (No. of samples in brackets)	Fecal Coliforms
May	203.3 (3) *	8.2 (5)
June	492.5 (27)	94.3 (27)
July	310.3 (29) **	84.1 (29) **
August	167.7 (23)	27.9 (23)

* excludes two 11,000 + total coliform values

** excludes one 8,000+ total coliform and one 160 + fecal coliform count.

APPENDIX B

YEARLY DATA FOR THE SIX BATHING BEACHES DISCUSSED.

MOONEY'S BAY BEACH

- YEARLY DATA 1962 to 1970 -

Year	GEOMETRIC MEAN PER 100 ML Total Coliforms (No. of samples in brackets)	Fecal Coliforms
1962	59.2 (10)	20.9 (10)
1963	145.7 (10)	5.9 (10)
1964	401.1 (8)	96.1 (9)
1965	188.0 (7)	29.7 (8)
1966	270.2 (9)	104.2 (9)
1967	2,654.3 (13)	1,570.7 (13)
1968	591.9 (35)	107.2 (35)
1969	336.5 (173)	118.6 (173)
1970	132.4 (90)	47.5 (92)

BRIGHTON BEACH

- YEARLY DATA 1962 to 1970 -

Year	Geometric Mean per 100 ml	
	Total Coliforms	Fecal Coliforms
	(no. of samples in brackets)	
1962	822.5 (8)	277.1 (8)
1963	412.3 (7)	99.2 (7)
1964	1,546.7 (4)	520.8 (4)
1965	3,019.9 (6)	1,371.1 (7)
1966	849.7 (8)	613.6 (8)
1967	4,571.1 (10)	2,419.3 (10)
1968	6,636.8(13)	3,205.8 (13)
1969	385.5 (17)	123.3 (17)
1970	317.6 (70)	110.6 (70)

BRANTWOOD BEACH

- YEARLY DATA 1962 to 1970 -

Year	Geometric Mean per 100 ml: Total Coliforms (No. of samples in brackets)	Fecal Coliforms
1962	992.1 (5)	374.0 (5)
1963	271.5 (7)	48.1 (7)
1964	482.9 (9)	209.2 (9(
1965	422.5 (7)	244.6 (7)
1966	215.4 (9)	58.3 (9)
1967	2,057.2 (10)	891.0 (10)
1968	3,061.4 (16)	469.8 (16)
1969	621.0 (18)	-
1970	201.8 (74)	82.9 (78)

STRATHCONA BEACH

- YEARLY DATA 1962 to 1970 -

Year	Geometric Mean per 100 ml. Total Coliforms	Geometric Mean per 100 ml. Fecal Coliforms
	(No. of samples in brackets)	
1962	370.3 (5)	66.7 (5)
1963	484.7 (8)	85.8 (8)
1964	753.1 (7)	154.0 (7)
1965	1,938.1 (5)	367.0 (6)
1966	1,115.2 (11)	530.9 (11)
1967	1,958.8 (12)	1,034.6 (12)
1968	3,028.3 (15)	1,006.0 (15)
1970	344.0 (28)	151.4 (30)

BRITANNIA BEACH

- YEARLY DATA 1962 to 1970 -

Year	Geometric Mean per 100 ml Total Coliforms	Fecal Coliforms
	(no. of samples in brackets)	
1962	235.0 (6)	81.3 (6)
1963	127.1 (5)	8.6 (5)
1964	228.2 (9)	55.3 (9)
1965	378.6 (12)	218.2 (12)
1966	1,240.1 (9)	202.8 (10)
1967	453.7 (15)	195.2 (15)
1968	980.9 (32)	68.0 (32)
1969	690.0 (9)	200.0 (9)
1970	186.3 (87)	51.0 (87)

WESTBORO BEACH

- YEARLY DATA 1958 to 1970 -

Year	Geometric Mean per 100 ml	
	Total Coliforms	Fecal Coliforms
	(No. of samples in brackets)	
1962	279.5 (6)	81.6 (6)
1963	303.9 (5)	17.5 (5)
1964	131.3 (9)	24.6 (9)
1965	351.5 (24)	38.7 (13)
1966	448.9 (9)	64.4 (10)
1967	874.1 (23)	186.1 (23)
1968	483.3 (29)	75.4 (29)
1969	689.5 (6)	172.1 (6)
1970	299.3 (82)	56.2 (84)

APPENDIX C

REGIONAL AREA HEALTH UNIT BACTERIOLOGICAL RESULTS FOR 1970.

MOONEY'S BAY, 1970

		Total/Fecal
May	12	500/150
	12	500/250
	19	70/18
	19	90/66
	26	60/24
	26	11000+/10
	28	2600/14
	28	500/14
	28	11000+/50
June	2	270/140
	2	65/12
	2	85/32
	4	235/26
	4	44/44
	3	45/22
	4	200/30
	9	140/12
	9	40/10
	9	15/10
	11	180/22
	11	110/12
	11	85/10
	18	1600/460
	18	270/82
	18	42/42
	19	25/18
	19	235/118
	19	25/4
	23	700/540
	23	30/30
	23	600/600
	25	30/6
	25	55/12
	25	60/14
	29	4100/220
	29	1900/1200
	29	1400/900
July	2	30/6
	2	40/6
	2	20/6
	3	20/8
	3	15/10
	3	20/14
	8	15/12
	8	65/2
	8	12/12
	13	60/14
	13	200/28
	13	200/28

		total/Fecal
June	13	175/46
	15	1100/1100
	15	2000/1300
	15	2900/1500
	17	3000/2400
	17	2900/1500
	17	3100/3100
	21	210/54
	21	120/32
	21	160/38
	23	60/48
	23	45/32
	23	42/42
	27	95/20
	27	95/18
	27	65/36
	28	10/8
	28	12/12
	28	0/0
	29	140/26
	29	95/42
	29	100/38
Aug	4	210/80
	4	900/900
	4	700/700
	5	60/38
	5	70/44
	11	75/36
	11	46/46
	11	40/34
	12	85/38
	12	150/66
	12	90/52
	17	115/34
	17	85/28
	17	100/42
	19	1300/800
	19	900/300
	19	1600/800
	24	65/36
	24	60/22
	24	70/30
	31	190/54
	31	210/52

BRIGHTON BEACH 1970

June	15	140/58 165/116 100/50
June	18	1800/570 740/128 350/116
"	23	150/105 105/80 90/40
"	25	4000/680 3800/1600 4000/1600
"	29	260/94 235/84 290/106
July	2	285/104 2300/220 2100/290
"	6	480/420 215/200 165/130
"	8	155/100 84/84 115/86
"	13	1600/76 375/30 295/24
"	15	160/24 500/400 185/18
"	20	65/52 65/52 70/34
"	22	800/800 305/144 2600/800 2400/300 2500/500
"	27	120/88 135/126
"	28	200/112 300/300
July	29	1300/1300 1900/400
May	13	220/56 100/36
"	26	100/92
"	28	540/14 4700/42 190/2
June	2	630/94 620/170 800/120
"	4	380/120 420/90
"	9	225/140 220/72 250/134
"	11	220/124 110/60 175/126

Aug.	4	180/84
"	5	300/300 60/60
"	11	110/64 105/64
"	12	85/70 70/62
"	17	8000+/8000+ 8000+/8000+
"	19	200/200 265/86

BRANTWOOD BEACH 1970

		Coliforms Total/Faecal
May	13	180/20
	25	160/80
	28	4500/2
	28	100/50
	28	120/14
June	9	135/70
	9	160/76
	9	170/72
	11	235/96
	11	180/64
	11	175/60
	15	120/46
	15	135/54
	15	130/52
	18	200/122
	18	265/50
	18	290/150
	2	280/120
	4	330/220
	4	280/190
	4	510/170
	2	490/120
	2	600/190
	23	105/40
	23	46/46
	23	65/40
	25	205/108
	25	140/64
	25	175/118
	29	120/64
	29	75/36
	29	90/38
July	2	60/38
	2	100/54
	2	60/18
	6	115/110
	6	120/110
	6	70/48
	8	65/32
	8	60/26
	8	95/38
	13	8000+/600
	13	800/20
	13	1200/80
	15	210/100
	15	220/80
	15	215/120
	20	205/100
	20	195/52

		Coliforms Total/Faecal
July	20	185/70
	20	155/68
	20	185/70
	20	155/68
	22	2300/400
	22	1700/500
	22	8000+/2000
	27	500/300
	27	300/100
	28	90/86
	28	200/200
	29	1200/700
	29	2900/700
Aug.	5	32/32
	5	26/26
	4	175/34
	4	75/52
	11	200/74
	11	170/62
	12	245/24
	12	130/28
	17	8000+/2800
	17	8000+/2700
	19	130/52
	19	85/54
	24	60/20
	24	40/32
	31	1800/1000
	31	3000/600

STRATHCONA BEACH 1970

May	13	130/80
	25	360/150
June	4	1300/700
	4	500/400
	11	305/260
	11	630/600
	18	610/240
	18	650/320
	25	490/450
	25	480/450
July	2	5000/900
	2	320/290
	6	490/370
	6	320/320
	8	500/200
	8	110/64
	15	200/200
	15	350/100
	22	1100/200
	22	1100/300
	29	185/48
	29	100/60
Aug.	4	90/20
	4	90/18
	12	185/20
	12	160/4
	19	55/10
	19	80/6
	31	8000+/3700
	31	8000+/3600

BRITANNIA BEACH 1970

May	25	30/20
	28	390/390
		330/4
		230/230
		540/14
June	2	900/34
		710/64
		650/32
	4	220/88
		570/370
		45/14
	9	115/56
		230/64
	11	460/430
		530/480
		590/590
	15	22/4
		200/200
		18/14
		75/6
		55/12
		85/20
	18	50/2
		25/12
		20/8
	23	205/52
		205/42
		220/52
	25	390/140
		750/156
		1000/160
	29	130/70
		210/72
		190/50
July	2	220/128
		180/40
		265/76
	6	7000/3300
		235/108
		255/180
	8	500/104
		700/200
		340/42
July	13	115/46
		285/60
		70/26
	15	310/80
		175/66
		75/26
	20	70/6
		80/6
		70/16
	22	2700/200
	27	1100/500
		1200/300
		380/200
	28	95/46
		115/46
		220/100
	29	25/6
		30/6
		10/10
Aug.	4	365/104
		160/30
		165/54
	5	1700/20
		230/12
		80/36
	10	100/0
		60/12
		45/10
	12	125/30
		105/18
		135/22
	17	1100/1100
		900/500
		185/130
	19	3200/44
		45/8
		30/4
		50/10
	24	15/6
		65/18
		110/62
	31	900/600
		1800/300
		170/138

WESTBORO BEACH 1970

		Total/Faecal
May	13	50/18
	25	40/26
	28	# 1 4200/2
	28	# 2 1100+/4
	28	# 3 11000+/10
June	2	1000/170
	4	620/190
	4	1400/100
	4	1500/190
	11	245/90
	11	3300/400
	11	3200/3200
	15	300/26
	15	116/14
	15	70/22
	15	110/32
	15	365/150
	15	90/20
	18	2200/330
	18	1400/520
	18	3300/350
	2	540/60
	2	1100/1 70
	23	130/50
	23	175/36
	23	110/32
	25	740/240
	25	800/250
	25	1400/110
	29	145/24
	29	115/20
	29	80/34
July	2	95/82
	2	175/64
	2	165/96
	6	60/38
	6	135/76
	6	370/86
	8	115/26
	8	95/22
	8	130/24
	13	290/106
	13	8000 /110
	13	900/160
	15	2300/1000
	15	2300/300
	15	2900/600
	20	245/22
	20	130/20
	20	250/10
	22	3400/1700
	22	7500/3100

		Total/Faecal
July	22	4100/1400
	27	275/46
	27	500/108
	27	600/66
	28	190/100
	28	600/600
	28	500/100
	29	20/8
	29	10/6
	29	50/6
Aug	5	220/22
	5	120/20
	4	85/5
	4	115/18
	4	70/24
	10/8	100/6
	10	80/6
	10	60/4
	12	210/66
	12	2700/56
	12	2800/400
	17	1100/106
	17	1100/200
	17	900/100
	19	65/24
	19	35/22
	19	85/10
	24	60/56
	24	30/10
	24	35/26
	31	240/40
	31	185/44
	31	180/30